

REMARKS

This Amendment is in response to the non-final Office Action mailed April 22, 2002. The amendments to the specification correct minor errors. A substitute Abstract is attached to this paper. Now new matter is believed to be added in the application by this Amendment.

Status of the Claims

Claims 1-17 are pending in the application. Claims 6-17 are newly presented for the Examiner's consideration. Support for new claim 6 can be found at page 7 of the specification. Support for new claims 7 and 8 can be found at page 8 of the specification. Support for new claim 9 can be found at page 9 of the specification. Support for new claim 10 can be found in claims 1 and 3. New claim 11 corresponds to claim 2. New claim 12 corresponds to claim 4. New claim 13 corresponds to claim 5. New claim 14 finds support at page 7 of the specification. New claims 15 and 16 find support at page 8 of the specification. New claim 17 finds support at page 9 of the specification.

Rejection Under 35 U.S.C. § 103(a) over Cole

Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. § 103(a) as being obvious over Cole (U.S. Patent 4,398,805). Applicant traverses this rejection and respectfully requests reconsideration and withdrawal thereof.

The Present Invention and Its Advantages

The present invention pertains to a liquid crystal display having good efficiency that can be easily manufactured. As set forth in claim 1 and at Fig. 5, the transflective liquid crystal display contains a liquid crystal display panel having a first transparent substrate 112, a second transparent substrate 100 and a liquid crystal layer 110 interposed between the first and second transparent substrates. The first transparent substrate 112 has a color filter 111. The second transparent substrate 100 has a pixel electrode 104 and a reflector 102. The reflector 102 has a light transmitting hole 103 which the pixel electrode 104 covers, and the light transmitting hole 103 transmits light. The transflective film 106 is located outside of the second transparent substrate 100 around the location corresponding to the light transmitting hole 103. As is shown in Fig. 6, the transflective film 106 is made of

a transmissive material 106b with reflective material 106a scattered therein. The reflective material 106a reflects light and the transmissive material 106b transmits light. The display device also includes a back light 108 to supply light towards the transflective film 106.

Although the present invention pertains to a transflective liquid crystal display device having a transflective film, Applicant notes that the liquid crystal display device would be transflective even if the transflective film was not present. That is, the liquid crystal display device of claim 1 without a transflective film is a transflective type in itself, because it has a pixel electrode and a reflector having a transmitting hole. The transflective film of the invention is an additional element to increase the efficiency of reflection. As a result, the present invention obtains advantages which are neither disclosed nor suggested by the prior art references.

Distinctions of the Invention Over the Applied Art

The Examiner turns to Fig. 3 of the application and page 3 of the specification to allege a transflective liquid crystal display of the prior art. However, this disclosure was merely to discuss

the state of the conventional art which the present invention supercedes. That is, the related art discussed in the specification and set forth in the figures is not prior art. Further, the Applicant has made no admission or acknowledgement that this information constitutes prior art. Accordingly, the utilization of the Applicant's disclosure to allege prior art is improper.

The Examiner then turns to the Cole patent for teachings pertaining to a back light and a transflective film made of silver.

However, the present invention pertains to a transflective film having pieces of reflective material such as Al or Ag scattered within. That is, there are chunks of metallic Ag or Al suspended in an acrylic matrix. Instant claim 1 recites a transflective film "made of a transmissive material with reflective material scattered therein."

In contrast, Cole at column 5, lines 2-5 states "Transflector means 30 was **diffuse metallic silver coating**, having about 5% transmission, and was **fabricated directly upon the exterior rear substrate surface** 14a." (emphasis added). As a result, it is clear that Cole teaches forming an Ag coating functioning as a partially transmissive mirror. In comparison, the present

invention does not use Ag or Al as a mirror coating, but rather uses chunks of these metals suspended in a matrix.

As has been shown, the Applicant's disclosure when combined with the teachings of Cole would not motivate a person having ordinary skill in the art to produce an embodiment of the invention as set forth in claim 1 where a transflective film is "made of a transmissive material with reflective material scattered therein." Thus, a *prima facie* case of obviousness has not been made over the Applicant's disclosure combined with Cole, even if it is assumed that the improper combination of the Applicant's disclosure with Cole can be made. Claims dependent upon claim 1 are patentable for at least the above reasons alone. Accordingly, this rejection is overcome and withdrawal thereof is indicated.

Rejection Under 35 U.S.C. § 103(a) Over Applicant's Disclosure,
Cole, Angell and Hayashi

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the Applicant's disclosure in view of Cole (as applied to claim 1) and further in view of Angell (U.S. Patent No. 5,821,867) and Hayashi (U.S. Patent No. 6,204,903). Applicant traverses this rejection and respectfully requests reconsideration and withdrawal thereof.

Angell and Hayashi fail to address the deficiencies of the Applicant's disclosure and Cole in suggesting a claimed embodiment of the invention. Angell and Hayashi additionally fail to address the inability of the Applicant's disclosure to be combined with Cole.

The Examiner turns to the Angell patent for teachings of an acrylic transflector. However, Angell is non-analogous art pertaining to an instrument panel of an automobile and not to a liquid crystal display. Also, Angell at column 3, lines 23-32 discloses using a coating to increase reflectivity, similar to the Cole patent discussed above. As a result, all of the distinctions of the invention over the Cole patent are equally applicable to the Angell patent.

The Hayashi patent pertains to a ridged reflector for a liquid crystal display. The Hayashi patent at column 7, lines 25-50 discusses mixing metal powders or pearlescence with resins to obtain a semitransmissive reflector. The Hayashi patent fails to teach the use of a transreflective film in conjunction with a hole in a liquid crystal display.

As has been shown, the Angell patent and the Hayashi patent fail to address deficiencies of Cole and the Applicant's disclosure

in suggesting an embodiment of the invention. Further, the Angell patent is from non-analogous art. Also, the Hayashi patent fails to suggest the use of a transflective film in conjunction with the hole in the liquid crystal display. As a result, the combination of the Applicant's disclosure, the Cole patent, the Angell patent and the Hayashi patent, fail to suggest the invention as is embodied in claim 3, assuming that these references could be combined. Thus, a *prima facie* case of obviousness has not been made over claim 3. Accordingly, this rejection is overcome and withdrawal thereof is indicated.

Prior Art Made of Record and Not Relied Upon by the Examiner

The prior art made of record and not relied upon by the Examiner shows the status of the conventional art. Accordingly, no further remarks are necessary.

Conclusion

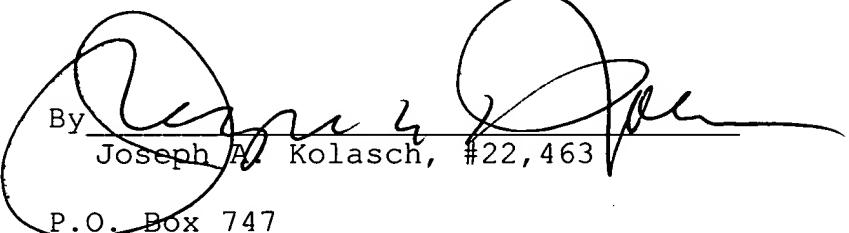
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert E. Goozner, Ph.D. (Reg. No. 42,593) at the telephone number of the undersigned below, to conduct an

interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT OF THE DISCLOSURE:

The Abstract of the Disclosure has been amended as follows:

[The present invention discloses] A transflective liquid crystal display device, including: a liquid crystal display panel having a first transparent substrate, a second transparent substrate, and a liquid crystal layer interposed between the first and second transparent substrates, the first transparent substrate having a color filter, the second transparent substrate having a pixel electrode and a reflector, the reflector having a light transmitting hole which the pixel electrode covers, and the light transmitting hole [transmitting] transmits light [;]. A transflective film is located outside of the second transparent substrate of the liquid crystal display panel around a location corresponding to the light transmitting hole, and is made of a transmissive material with reflective material scattered thereon, such that reflective material [reflecting] reflects light and the transmissive material [transmitting] transmits light[; and]. A back light device [for supplying] supplies light toward the transflective film.--

IN THE SPECIFICATION:

The paragraph beginning on page 1, line 23, has been amended as follows:

At this time, the two polarizers have a transmittance of 45%, the two substrates have a transmittance of 94%, the TFT array and the pixel have a transmittance of 65%, and the color filter has a transmittance of 27%, respectively. Therefore, the transmissive LCD device gets to have [about a transmittance of] a transmittance of about 7.4% as seen in Fig. 1, which shows [a] transmittance after light passes through each of the layers. For such a reason, the transmissive LCD device requires a high brightness, and thus [an] electric power consumption by the backlight device increases. In order to supply [a] sufficient power to the backlight device, a relatively heavy battery is employed, and there still [exists] exists a problem that the battery can not be used for a long time.

The paragraph beginning on page 4, line 22, has been amended as follows:

In order to achieve the above object, the preferred embodiment of the present invention provides a transflective liquid crystal

display device, including a liquid crystal display [panel,] panel, a transflective film, and a backlight device. The liquid crystal display panel has a first transparent substrate, a second transparent substrate, and a liquid crystal layer interposed between the first and second transparent substrates. The first transparent substrate has a color filter and the second transparent substrate [having] has a pixel electrode and a reflector. The reflector has a light transmitting hole which the pixel electrode covers. The light transmitting hole transmits light. The transflective film is located outside of the second transparent substrate of the liquid crystal display panel around a location corresponding to the light transmitting hole. The transflective film is made of a transmissive material with reflective material scattered on the upper surface of the transmissive material. The reflective material reflects light, and the transmissive material transmits light. The back light device [supplys] supplies light toward the transflective film.

The paragraph beginning on page 7, line 23, has been amended as follows:

Further, a concentration of the reflective material 106a scattered on the upper surface of the acrylic-based resin 106b is adjustable. Therefore, since the LCD devices for use in a mobile phone, a personal digital assistants (PDA) and a portable notebook computer uses the reflective mode as a main mode, by increasing an amount of the reflective material 106a scattered on the acrylic-based resin 106b, the transflective LCD device having the reflective mode as the main mode can be manufactured. Alternatively, by decreasing an amount of the reflective material 106a scattered on the acrylic-based resin 107b, the transflective LCD device having the [transflective] transmissive mode as the main mode can be manufactured.

IN THE CLAIMS:

The claims have been amended as follows:

2. (Amended) The transflective liquid crystal display device of claim 1, wherein the reflective material of the transflective film is selected from [a] the group consisting of Ag and Al.

3. (Amended) The transflective liquid crystal display device of claim 1, wherein the [transflective material] transmissive material of the transflective film is an acrylic-based resin.

Appl. No. 09/621,281

Claims 6-17 have been added.